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Title: Discussion papers on the topic of more adequate and effective ICT tools category: tools for making didactic videos

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Discussion Papers on the Topic of More Adequate and Effective ICT Tools Category: Tools for Making Didactic Videos

Abstract

The article describes some preliminary results of the implementation of Work Package 4 (WP4) “Selection and testing new ICT tools” within a framework of the international research network IRNet and researchers from partner institutions from Poland, Slovakia, Ukraine and Australia. These results concern analyzing and studying some categories of ICT tools for making didactic videos. The whole package period was divided into several main stages 1–5. The role of multimedia in teaching is considerable since they offer various information presentation formats simultaneously. The advantage of combining text, audio, images, animation, video and hyperlinks lies in the use of both main channels – visual and verbal – for making didactic videos in an efficient way. Features of an effective presentation and examples of computer programs which may be used for this purpose have also been shown in the paper. The authors presented a ranking list based on the quality

and quantity assessment of choosing ICT tools, proposed some recommendations of features of good didactic videos and analyzed some mistakes users make most frequently while elaborating didactic videos.

K e y w o r d s: information and communication technology (ICT), ICT tools, didactic videos, Custom Satisfaction Evaluation Model, international research network

Introduction

This paper aims to discuss the implementation of Work Package 4 (WP4) with a special emphasis on the tools for making didactic videos. The authors elaborate on how to select and test new ICT tools, but also identify general methodological aspects of their effective use in education. Here we present a summary of the main aims of Work Package 4:

- testing ICT tools and the effectiveness of their use in education,
- developing the didactic video models,
- studying and elaborating types and categories of didactic videos,
- designing a list of items to define the quality of suggested tools for making didactic videos and their relative importance 1–5,
- developing a ranking list of ICT tools for making didactic videos,
- conducting a research on pedagogical and methodological aspects of the use of didactic videos, and
- characterizing methodological and technological aspects of multimodal didactic communication.

Methodology and Stages of Research

According to the road map of all periods of implementation, this WP has been divided into several main stages 1–5.

Stage 1 includes:

- identifying necessary skills to teach in the school of the future according to previous studies made and documents available,
- absolutely necessary skills:
 - knowing how to present content in multimedia format (presentations and didactic videos),

- recommended skills:
 - communication,
 - collaboration,
 - creativity,
 - critical thinking and problem solving,
 - productivity,
 - reflection and feedback,
 - social networking, and
 - searching.

Due to the analysis of different IT-tools and their application in education, conducted by the team of international researchers, there has been specified a different category of application, in particular Module 01, which contains:

- tools for making presentations, and
- tools for making didactic videos.

Stage 2: Tools identified by the team are expected to be reported in a Google Drive document available for remote collaborative work.

July: Teams responsible for identifying tools should present items to be used as criteria for evaluating and comparing tools by each task to implement a CSEM (Custom Satisfaction Evaluation Model).

Stage 3 (September–October): Comparison and summary of the relative importance of tools, using a CSEM.

After a comprehensive analysis of a range of tools for making didactic videos several main, more effective tools were identified. Among such tools there are:

Main tools:

- Adobe Connect,
- Camtasia,
- Adobe Captivate,
- HyperCam, and
- BB Flashback Express.

Additional tools:

- Screenr,
- Snagit,
- Lightworks,
- Windows Movie Maker,
- Blender, and
- other.

General Background of Research

Didactic Video Evolution

The concept of didactic video has undergone dramatic changes over the years. At the times of video cassette recorders, viewing videos was possible only from the same physical cassette (Pitman, 1989). The presentation of a video to students demanded taking it from the library collection, planning the class, taking care of the equipment, and overcoming challenges such as low quality sound and blurred images (Woolfitt, 2015, p. 6).

The view on evolution of video tools as they are used in teaching was suggested by SURFnet/Kennisnet (2011, p. 5). Below we present an adapted view on the evolution of video as suggested by Greenberg & Zanetis (2012). As we can see from their graph, recent decades have made tremendous difference in the way of teaching, the 2000s and the 2010s added lectures, screen casts and live lecture capture. We are yet to see what possibilities new video tools will bring us.

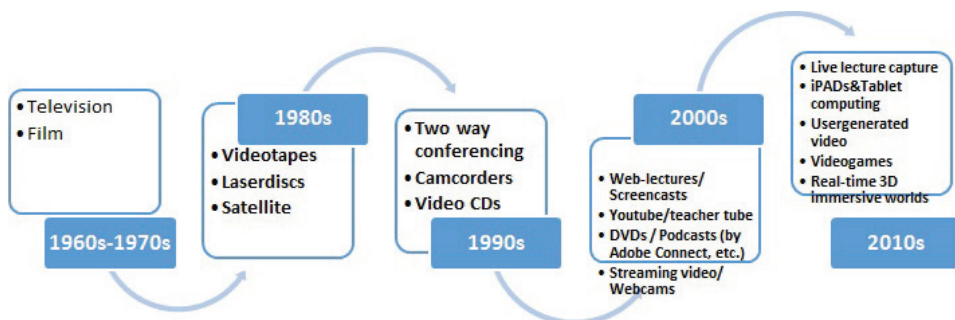


Figure 1. Timeline of educational video technology (partly based on Greenberg & Zanetis, 2012).

Source: <https://www.inholland.nl/media/10230/the-effective-use-of-video-in-higher-education-woolfitt-october-2015.pdf>.

Hansch et al. (2015) analysed the video components in a variety of MOOC courses and interviewed the instructional designers. Their analysis led to video types based on what they refer to as the “different affordances of Video” and list nine features that include:

- building rapport,
- virtual field trips,
- manipulating time and space,
- telling stories,
- motivating learners,
- historical footage,

- demonstrations,
- visual juxtaposition, and
- multimedia presentation (Woolfitt, 2015).

Figure 2 shows another classification of the type and category of didactic videos.

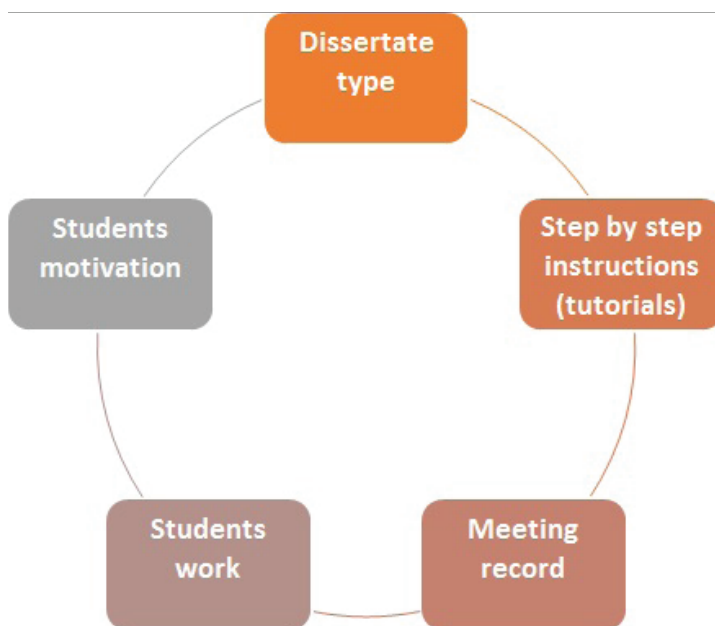


Figure 2. Type and category of didactic videos.

Source: Reis, 2015.

The list below presents the proposals of overview of different representations of video:

- clip/fragment (YouTube),
- Khan Academy (covering a specific subject),
- Feature Film/documentary,
- Live Lecture Capture (technician or student recording),
- Live Lecture Capture (automatic recording, or iPad Swivl),
- web lecture (pre-recorded studio lecture, covering several subjects) (10–45 min.),
- Knowledge Clip (pre-recorded studio lecture, covering one subject) (5–10 min.),
- Micro Clip (pre-recorded studio lecture, covering one subject) (1–5 min.),
- self-made web lecture (pre-recorded lecture by teacher, e.g. using MyMediasite, from teacher's own computer),

- Screen Cast (with audio and visual) (does teacher need to be in view?) (showing mouse clicks, on screen action),
 - Webinar (live streamed discussion, recorded),
 - Google HangOuts (live streamed discussion, instantly available on external server, e.g. YouTube),
 - Skype/FaceTime (can be recorded),
 - Virtual Classroom,
 - student generated video content, and
 - video recording of students (by students/lecturer) (Woolfitt, 2015, p. 18).
- Other proposals are presented in Figure 3.

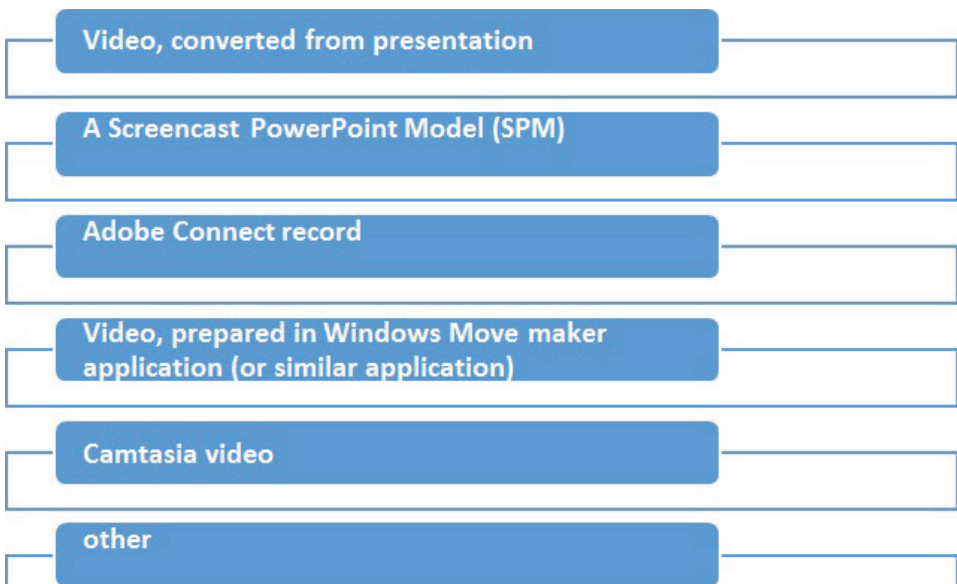


Figure 3. Didactic video models.

S o u r c e: Own elaboration.

Instruments and Procedure

Experts of the IRNet consortium from the University of Silesia (Poland), Coordinator, Constantine the Philosopher University (Slovakia), Borys Grinchenko Kyiv University (Ukraine), Dneprodzerzhinsk State Technical University (Ukraine), and Curtin University (Australia) conducted the analysis and discussion concerning more important activities of tools for making didactic videos (Tables 1–5).

Table 1.

Camtasia Description, Activities, and Marking Guide

Title of Application	Description	Activities	Marking Guide
1) Camtasia (https://www.techsmith.com/camtasia.html)	<p>Screen Recording & Video Editing. A powerful, yet easy-to-use screen recorder, Camtasia helps you create professional videos without having to be a video pro.</p> <p>Easily record your screen movements and actions, or import HD video from a camera or other source.</p> <p>Customize and edit content on both Mac and Windows platforms, and share your videos with viewers on nearly any device.</p> <p>30 days are free (necessary registration on the web-site).</p>	<p>Record Anything Record high-quality videos in no time with Camtasia's advanced screen recorder</p> <p>Edit Video Faster Create more professional videos without having to be a video pro. Multi-track Timeline Green Screen Effect Visual Effects Animate Content</p> <p>Share Anywhere Easily share your videos and interact with your audience. Camtasia's expansive sharing capabilities allow your viewers to watch your videos anywhere, on nearly any device.</p>	<p>Product Training and Tutorials Users supported by <i>free videos, tutorials, guides</i>, and more. (https://www.techsmith.com/tutorial.html)</p>

Table 2.

Adobe Captivate Description, Activities, and Marking Guide

Title of Application	Description	Activities	Marking Guide
2) Adobe Captivate (http://www.adobe.com/products/captivate/features.html)	<p>Adobe captivate is a professional software to create e-learning content.</p> <p>From storyboarding to responsive eLearning, create virtually any kind of professional looking and instructionally sound content using a single tool.</p>	<ul style="list-style-type: none"> • Best-in-class screen capture • High-definition screencast • Audio-video support and synchronization • Scenario branching • Text to speech • Support for right-clicking in simulations • Auto-text captions • Table of contents and Aggregator • Text enhancements • Pan and zoom support • Customizable skins <p>Test and track</p> <ul style="list-style-type: none"> • Comprehensive quizzing • Knowledge Check questions • Responsive drag-and-drop interactions • Pretest and branch-aware quizzing 	<p><i>Learn</i></p> <ul style="list-style-type: none"> • Get Started • Tutorials • User manual • Previous versions • Developer • Connection

Table 3.
HyperCam Description, Activities, and Marking Guide

Title of Application	Description	Activities	Marking Guide
3) HyperCam (http://www.hyperionics.com/)	<ul style="list-style-type: none"> Record video of users entire screen and save it to a file. HyperCam is an app that allows you to video capture the action from an area of users PC desktop. Hyper Come v2 is free, v3 is commercial (trial version is free) 	<ul style="list-style-type: none"> HyperCam™ is powerful video capture software that records AVI movies (screencam) directly from your monitor, for <i>software presentations, software training, demos, tutorials, and fun!</i> HyperCam supports text annotations, sound, and screen notes (great for creating automated software demos!). User can also select Frame rate and compression quality prior to video capture. Compatible with 32 bit and 64 bit releases of Windows. 8, Windows 7, Vista, XP, 2000. 	HyperCam 3 Tutorial elaborated by Solveing Multimedia (http://www.solveigmm.com/en/howto/hypercam-3-tutorial/).

Table 4.
Adobe Connect Description, Activities, and Marking Guide

Title of Application	Description	Activities	Marking Guide
4) Adobe Connect (http://www.adobe.com/pl/products/adobeconnect.html)	<ul style="list-style-type: none"> Adobe Connect web conferencing software offers immersive online meeting experiences from small group collaboration to large scale webinars. All the benefits of Adobe Connect Meetings are included with Adobe Connect Webinars and Adobe Connect Learning. Possibility record a video (podcast) multi-windows screen with presentation, editing and sharing. Commercial product. 	<p><i>Adobe Connect Meetings</i></p> <ul style="list-style-type: none"> Discover the true power of digital meetings Access across device Personal digital office Rich recording and editing tools Highly secure communication and compliance <p><i>Adobe Connect Webinars</i></p> <ul style="list-style-type: none"> The all-in-one webinar solution for marketers Immersive experiences Robust registration Fully customizable events Built-in analytics Adobe Connect Learning <p><i>The complete digital learning solution for trainers</i></p> <ul style="list-style-type: none"> Engaging content delivery Mobile learning across devices Immersive classes live and on-demand Efficient training management and tracking 	<p><i>Learn</i></p> <ul style="list-style-type: none"> Get Started Tutorials User manual Previous versions Developer Connection

Table 5.
BB FlashBack Express Description, Activities, and Marking Guide

Title of Application	Description	Activities	Marking Guide
5) BB FlashBack Express (http://www.bbsoftware.co.uk/BBFlashBack_FreePlayer.aspx)	<ul style="list-style-type: none"> Record your screen, sound and webcam Share movies with one-click upload to Youtube and other video sharing sites Save movies as Flash or AVI files According to experts' opinions it is one of the best Free Screen Recorders 	<ul style="list-style-type: none"> Record Everything Screencast Sharing Flexible Publishing Webcam Recording Full-Featured Recording 	<ul style="list-style-type: none"> Getting started: How to record Editing and Annotatin More tutorial videos Help manual

Data Analysis

During the discussion and analysis of the previous experience, a list of items has been elaborated to define the quality of suggested tools for making didactic videos and their relative importance 1–5 (Table 6); also, a ranking list of ICT tools for making didactic videos has been prepared (Table 7).

Table 6.
A list of items to define the quality of suggested tools for making didactic videos and their relative importance 1–5

Items	US	UKF	BGKU	DSTU	CU	Total
1 Useful	5	5	5	5	5	25
2 Educational potential	5	5	5	5	5	25
3 Multifunctionality	5	3	5	4	5	22
4 Survey options	4	5	3	5	3	20
5 Friendly interface	5	3	5	5	5	23
6 Free	4	5	5	5	4	23
7 Group collaboration work support	5	3	3	5	5	21
8 Webinars support	5	4	5	4	5	23
9 Podcast support	5	4	5	4	5	23
10 Include the Tools for scheme and graph creation	5	5	5	5	5	25
11 Multi-windows interface	5	4	4	4	5	22
12 Customize and edit content on both Mac and Windows platforms	4	4	4	2	2	16

Table 7.
Ranking list of IT-tools for making didactic videos

Tools	Points
Tool 1: Adobe Connect	252
Tool 2: Camtasia	239
Tool 3: Adobe Captivate	235
Tool 4: HyperCam	204
Tool 5: BB Flashback Express	196

Pedagogical and Methodological Aspects of Didactic Videos

Below we list more important pedagogical aspects of didactic videos.

- Ongoing technological revolution has given birth to the new concept of “flipped classroom”, centered around the idea of screen casting, which has become a widely used methodology.
- The general algorithm of teaching in the classroom is changed in flipped classroom, where teachers prepare video lectures outside of the classroom for their students to study before class, while traditional home tasks and practical tasks are done together in the classroom.
- Screen casts can be used alternatively in this new classroom model, that is – as a source of instructions for the students (Ruffini).

Methodological aspects of the use of didactic videos are presented below.

- “There are many outstanding Web 2.0 tools for the classroom to promote teaching and learning. Web 2.0 tools such as a blog, wiki or YouTube are innovative ways of creating, collaborating, editing and sharing user-generated content online.
- One of the most popular Web 2.0 tools is the screencast.
- Screencasting has emerged as the teaching tool for online instruction” (Ruffini).

How does the Flipped Classroom work?

- “The flipped classroom is organized around the material students learn out of class by viewing a video of the teacher’s lecture posted online. By viewing the teacher’s lecture online, class time is used for answering questions about the material covered on the video and for class activities.
- Teachers may have students solve problems or answer questions and have them write down any questions related to the material on video that they did not understand (Liles, 2012).
- Once the students are in the classroom, the teacher will work with the students needing help either one-on-one or in a group setting” (Ruffini).

PowerPoint Screencast is presented below.

- “Camtasia Studio 8 has a PowerPoint plug-in which can record a PowerPoint presentation and narration.
- Almost all teachers use PowerPoint presentations for teaching.
- Using a PowerPoint presentation as a framework for a screencast makes sense because the content is already created.
- In Camtasia including a narration and infusing multimedia elements such as music, audio, video and quiz makes for a powerful learning resource tool” (Ruffini).

A Screencast PowerPoint Model (SPM) steps include:

- introduction,
- content PowerPoint,

- content video,
- credits,
- end, and
- assessment (Ruffini).

Some Recommendations Concerning the Use of Didactic Videos in Distance Learning Courses

If the teacher's lecture is planned to be conducted during their own course in a blended or online format, it is recommended not simply to record hour-long lectures as stressed authors do (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/tips-for-designing-video>). Research shows that students do not engage in online lecture content in the same way as they do in face-to-face lectures. Shorter, sharper, single concept videos of 6 minutes or less are much more effective learning tools than long lectures. It is necessary to break down the content in e-learning course, and to re-examine the learning objectives and what the teacher wants his/her students to achieve (http://theelearningcoach.com/elearning_design/chunking-information/).

Basic skills necessary for making a good didactic video are shown in Figure 4.



Figure 4. Basic skills necessary for making a good didactic video.

Source: Reis, 2012.

An author / a teacher should consider whether a video is in fact the best way for the students to learn the content. Students learn more effectively when they are actively involved in constructing their own meaning around information. Is there a more active way for your students to engage with this content? Sometimes video is the best option, especially for concepts difficult to grasp, but before starting a complex production, first it needs to be checked if there is an existing

open educational resource (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/open-content>) that a tutor could use instead. Additionally, one should be aware of the resources being produced by other teachers from educational institutions; collaboration with these teachers would be a rational and wise approach, because it would allow teachers to bring down the workload and share resources.

Explanations of concepts are also recommended. Students learn better from a coherent summary (Coherence Principle).

Using pictures and visual representations such as charts and diagrams together with audio narration to illustrate some points is essential and necessary in teaching, especially in the form of the a seminar, tutorial or lecture (<http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/best-practice-in-making-an-instructional-video>).

By using various multiple inputs, students will learn and benefit to create different mental models to capture, understand, and build connections for the unit and materials. (Multimedia principle) (Table 8).

Table 8.
The main findings and video production recommendations

Finding	Recommendation
Shorter videos are much more engaging.	Invest heavily in pre-production lesson planning to segment videos into chunks shorter than 6 minutes.
Videos that intersperse an instructor's talking head with slides are more engaging than slides alone.	Invest in post-production editing to display the instructor's head at opportune times in the video.
Videos produced with a more personal feel could be more engaging than high-fidelity studio recordings.	Try filming in an informal setting ; it might not be necessary to invest in big-budget studio productions.
Khan-style tablet drawing tutorials are more engaging than PowerPoint slides or code screencasts.	Introduce motion and continuous visual flow into tutorials, along with extemporaneous speaking.
Even high quality pre-recorded classroom lectures are not as engaging when chopped up for a MOOC.	If instructors insist on recording classroom lectures, they should still plan with the MOOC format in mind.
Videos where instructors speak fairly fast and with high enthusiasm are more engaging.	Coach instructors to bring out their enthusiasm and reassure that they do not need to purposely slow down.
Students engage differently with lecture and tutorial videos for tutorials.	For lectures, focus more on the first-watch experience, add support for rewatching and skimming.

S o u r c e : <http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/best-practice-in-making-an-instructional-video>.

When possible try interspersing visual content such as slides, graphics and screencasts with a video of the teacher talking. The teacher's presence is engaging for students.

However, for a content-focused video it is better to include text and diagrammatic supports as well as a video of the teacher talking, to help explain and illustrate concepts for students. For more complex projects, consider developing a storyboard to help you plan out the sequence and elements of your presentation. Getting it right in a storyboard first can save a lot of time during development and editing of your project. Storyboard template could be downloaded from <http://federation.edu.au/staff/learning-and-teaching/clipp/elearning-hub/video-recording/tips-for-designing-video>.

It will be correct if the author ties his/her videos back to the activities in their online course. It is essential to ensure that students will actually watch the videos and to provide them with consolidation opportunities by linking the viewing of the video with a follow-up activity such as a short quiz, choice activity or discussion post in your Moodle course.

It is necessary to remember about other important matters, such as developing a script before you start recording and understanding the implications of Copyright to a video project.

During research some suggestions concerning building up "Storytelling" of didactic videos have been set (Figure 5).

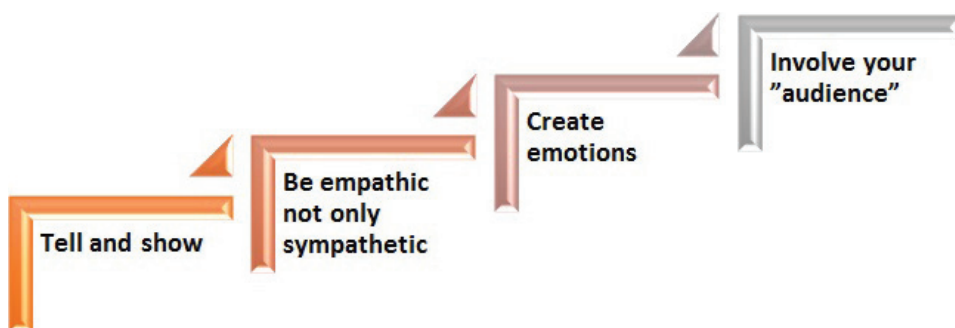


Figure 5. Suggestions concerning building up "Storytelling" of a didactic videos

Source: Jobs, 2008; Gallo, 2015; Reis, 2012.

3 basic rules are presented below.

- Text should summarize your narration and should be well structured.
- Synchronize text appearance and images animation with the narration in the slides.
- In the case of presentation for large auditorium never use large blocks of text, just emphasize your key ideas using short sentences (Reis, 2012).

Figure 6 presents the main recommendations for authors regarding a didactic video.

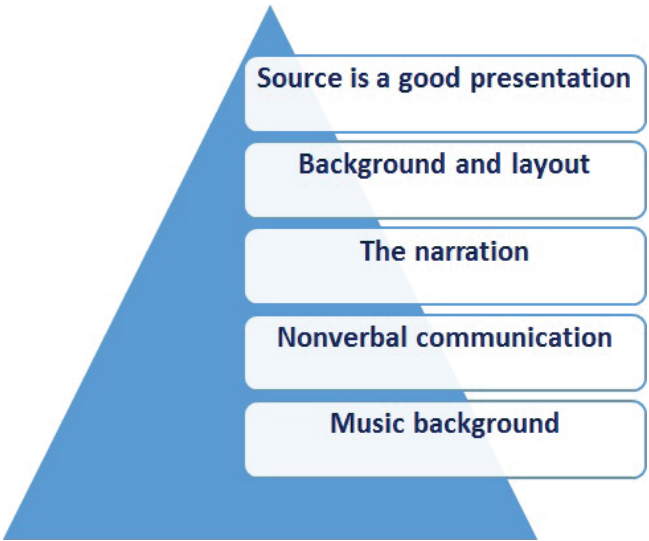


Figure 6. Main recommendations for authors regarding a didactic video

Source: <http://uex.adobeconnect.com/p4am6jj52rw>.

Main requirements concerning the didactic video are shown in Figure 7.

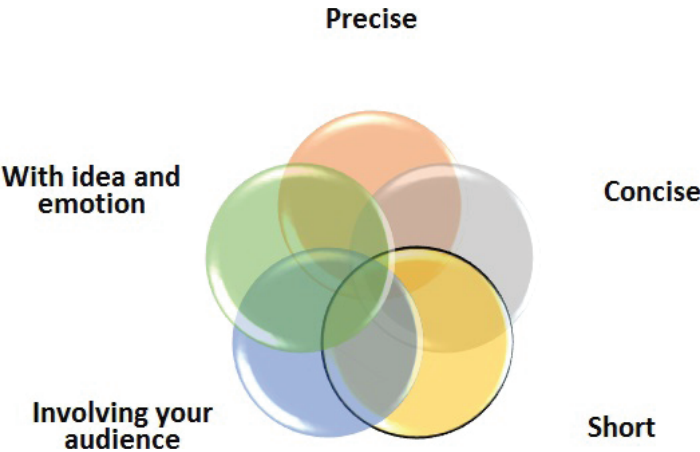


Figure 7. Main requirements concerning didactic videos

Source: <http://uex.adobeconnect.com/p4am6jj52rw>.

Figure 8 contains the 6 basic communication skills.

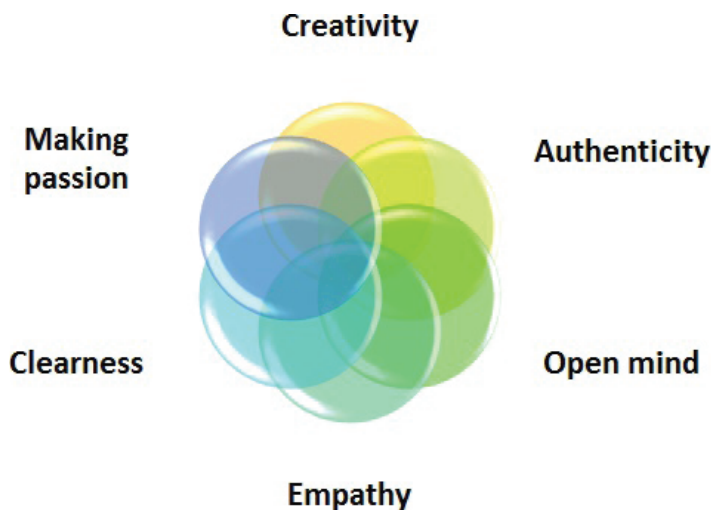


Figure 8. 6 basic communication skills.

Source: Reis, 2008, 2015.

Suggestions for authors of didactic videos are shown in Figure 9.

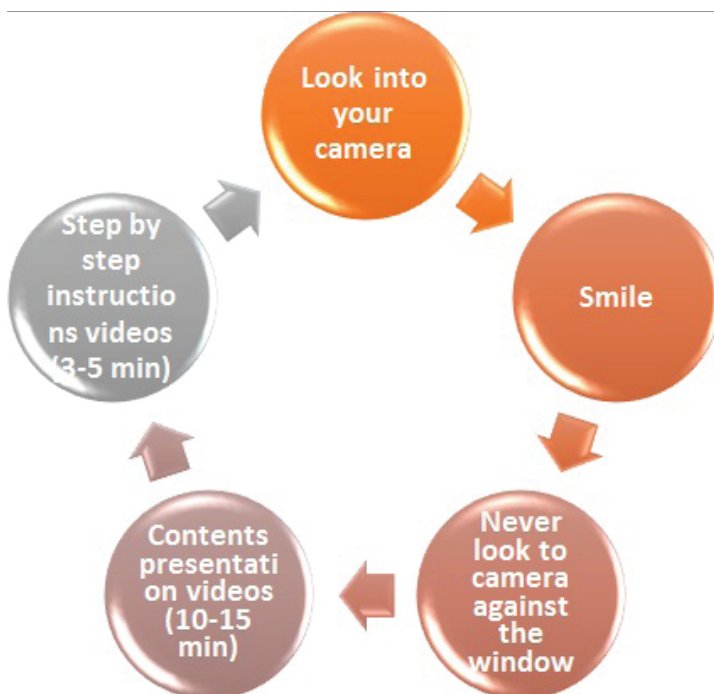


Figure 9. Suggestions for authors of didactic videos

Source: Reis, 2008, 2015.

Conclusions

This paper presented some temporary, preliminary results of research, conducted within WP4 “Selection and testing new IT tools,” module 01 “Tools for making didactic videos” by researchers of the IRNet consortium from the University of Silesia (Poland), Coordinator, Constantine the Philosopher University (Slovakia), Borys Grinchenko Kyiv University (Ukraine), Dneprodzerzhinsk State Technical University (Ukraine), and The Graal Institute (Portugal). During this study the researchers elaborated several scientific papers as well as recorded a number of videos, which in the future could be used in the project MOOC “*New ICT tools for effective use in education*” for the use of teachers, students, researchers, tutors, mentors and others. In the next stage, the researchers will examine and study the assessment by experts from different countries and universities around of the world. Final results will be published in next papers and manuscripts.

Acknowledgments

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Артыкул на temat bardziej odpowiednich i efektywnych narzędzi ict (tik).

Kategoria: narzędzia do tworzenia filmików dydaktycznych

Streszczenie

Niniejszy artykuł opisuje niektóre wstępne wyniki wdrożenia pakietu roboczego nr 4 „Wybór i testowanie nowych narzędzi informatycznych” w ramach międzynarodowej sieci badawczej IRNet i badaczy z partnerskich instytucji z Polski, Słowacji, Ukrainy i Australii. Wyniki te dotyczą analizy i badania określonych kategorii narzędzi ICT (TIK) do tworzenia filmików dydaktycznych. Cały pakiet został podzielony na pięć głównych etapów (1–5). Multimedia w nauczaniu odrywają ważną rolę, umożliwiają stosowanie różnorodnych form prezentacji informacji, które można wykorzystywać jednocześnie. Kombinacja tekstu, dźwięku, obrazów, animacji, filmików oraz hiperłączy posiada zaletę polegającą na korzystaniu z obydwu głównych kanałów – kanału wizualnego i werbalnego – dla dokonywania efektywnych prezentacji i wideo. W artykule tym przedstawiono także cechy efektywnego filmu dydaktycznego oraz przykłady programów komputerowych, które mogą być wykorzystywane w tym celu. Autorzy zaprezentowali ranking narzędzi ICT (TIK) oparty na ocenie jakościowej i ilościowej oraz pewne rekomendacje w zakresie cech dobrego filmu dydaktycznego. Przeanalizowali błędy, które są często popełniane przez użytkowników podczas tworzenia filmików dydaktycznych.

Słowa kluczowe: technologie informacyjno-komunikacyjne (TIK), narzędzia TIK, filmy dydaktyczne, satysfakcjonujący model oceny, międzynarodowa sieć badawcza.

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Дискуссионная публикация на тему наиболее актуальных и эффективных инструментов икт. Раздел: инструменты для создания дидактических видео

Аннотация

В статье описываются некоторые предварительные итоги выполнения рабочего пакета 4 (РП4) «Выбор и тестирование новых ИТ-инструментов» в рамках международной исследовательской сети IRNet исследователями из учреждений-партнеров Польши, Словакии, Украины, Австралии. Эти результаты относятся к анализу и изучению некоторых категорий ИКТ-инструментов для создания дидактических видео. Весь период работы по данному пакету был разделен на несколько основных этапов 1–5. Роль мультимедиа в обучении является значительной, так как она предлагает различные форматы представления информации одновременно. Сочетание текста, аудио, изображений, анимации, видео, а также гиперссылок имеет преимущество использования обоих из двух основных каналов – визуального и вербального – для презентации эффективным способом. Особенности эффективного представления и примеры компьютерных программ, которые могут быть использованы для этой цели, также указаны

в статье. Авторы представили список ранжирования на основе качества и оценки количества выбора ИКТ-инструментов и предложили некоторые рекомендации для создания хорошего дидактического видео, а также проанализировали некоторые частые ошибки пользователей в процессе разработки дидактических видео.

К л ю ч е в ы е с л о в а : информационные и коммуникационные технологии (ИКТ), средства ИКТ, дидактические видео, сатисфакционная модель оценивания, международная исследовательская сеть.

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**Documento de debate sobre las herramientas ict más adecuadas y eficaces.
Categoría: herramientas para hacer videos didácticos**

R e s u m e n

El artículo describe algunos resultados preliminares de la aplicación del paquete de trabajo 4 (WP4) “Selección y examen de las nuevas herramientas TIC” dentro del marco de la red internacional de investigación IRNeT e investigadores de entidades colaboradoras de Polonia, Eslovaquia, Ucrania, Australia. Estos resultados se encargan de analizar y estudiar algunas categorías de las herramientas TIC, destinadas a la creación de videos didácticos. El período completo del paquete se dividió en varias etapas de la 1–5. El papel de multimedia en el aprendizaje es importante ya que ofrece varios formatos de presentación de información simultáneamente. La combinación de texto, audio, imágenes, animación, video así como hipervínculos tiene la ventaja de usar los principales canales – el visual y el verbal – destinados a la creación de videos didácticos de manera eficaz. Se muestran en este trabajo características de presentaciones reales y ejemplos de programas de ordenador los cuales pueden ser usados con este fin. Los autores han expuesto una lista de clasificación basada en la evaluación de la calidad y la cantidad para elegir las herramientas TIC y han dado varios consejos sobre cómo hacer unos buenos videos didácticos y analizaron los errores más frecuentes cometidos mientras elaboraban videos didácticos.

P a l a b r a s c l a v e : tecnologías de la información y comunicación (TIC), herramientas TIC, videos didácticos, Modelo de Evaluación del Hábito de Satisfacción, red internacional de investigación.